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# THE INTERNATIONAL CONGRESS OF EXPERIMENTAL PSYCHOLOGY, HELD IN LONDON, AUGUST, 1893.

BY ARTHUR MACDONALD, SPECIALIST IN THE U. S. BUREAU OF EDUCATION, AND OFFICIAL DELEGATE TO THE CONGRESS.

ONE of the distinguishing features of the late International Congress for Psychology is the prominent part that physiological investigations assumed. This may be taken as an indication of the prevalent tendency to study the objective rather than the subjective side of consciousness. Yet not a few of the members read papers, which gave the results of an empirical study of subjective reality. The subject of hypnotism and allied states was also one of great interest to all.

Some of the most important questions considered were in the domain of the physiology of the brain, about which comparatively little is known. The statement has often been made that the frontal convolutions are the seat of the intellect as distinguished from the will and desire. This was based upon comparison in the development of this region in man and the lower animals, upon results of accident or disease in man and experiments upon monkeys by Ferrier, Horsley, and Schäfer, and upon dogs by Hitzig and Goltz. For the reason that antiseptic precautions were not taken in either Ferrier's earlier experiments or Goltz's or Hitzig's, it is not certain but that the results obtained may have been due to an extension of the effects of the injury. Professor Schäfer thought it worth while to repeat these experiments upon the prefrontal region by a mode of operation that entirely avoided the shock following from a bilateral removal of a more or less extensive part of the brain. He said that he had often noticed in operating upon the brain that extensive bilateral lesions are liable to be followed by apathy and apparent idiocy, whether the operations were in the frontal or in other regions, more in fact in the temporal than in the frontal region. He thinks it is very probable, therefore, that (1) the question of shock and (2) that of considerable loss of brain substance and removal of support from the rest of the brain (thus impairing the cerebral functions generally) may modify the result. For these reasons Professor Schäfer has recently operated, not by actually removing the portions of the brain, but by severing their connections with the rest of the mantle and with the brain-stem. This can be effected with scarcely any hemorrhage and with no perceptible shock. In several instances in which Professor Schäfer has thus severed the prefrontal lobes in monkeys, there was an entire want of appreciable symptoms. In no case did the animals show the dullness and apathy previously noticed, but they appeared as bright and intelligent after recovering from the effects of the anaesthetic as before the operation. These experiments, therefore, do not support the view that the prefrontal lobes are especially the seat of intelligent attention.

In this connection it will be interesting to note Professor Horsley's demonstration of localization of functions in the monkey's brain, which was given before a number of specialists and psycho-physicists. The monkey was put under the influence of an anaesthetic, and quite a portion of the cranium removed. By electric stimulation Professor Horsley demonstrated clearly the fact of localization; he was able to predict before applying the electrodes what movements would take place, as in the arm, fingers, and face. The experiment was very satisfactory to the witnesses, although Professor Horsley did not think it had succeeded as well as in many former cases when he had performed it before his classes. These now well-known localized areas in the brain of monkeys have been found also by Horsley and Schäfer in the anthropoid ape, which is still nearer man. But the proof has been made complete in a demonstration upon human beings by Professor Horsley. It was in the case of two epileptics in whom an operation was necessary. As far as the operation permitted, it was found that the same localization of function existed in man. It is well to note that the success of experiments upon animals is often due to developed operative skill, as is obtained in surgery. The writer has witnessed many operations of this nature by well-known specialists, but has never seen it so neatly done as by Professor Horsley. Professor Horsley

was also very careful to see that the animal felt no pain throughout the whole operation. One is reminded of Professor Munk's experiments on the dog at Berlin, which attracted great attention at the time. Both Munk and Horsley are surgeons.

It is true that, if one single function is localized, brain localization is established; but this *a priori* method is being made less and less necessary by experimentation. It would seem from these and other investigations that the intellectual function is diffused over the whole brain; this is strengthened by purely psychological considerations from the directing power of the reasoning faculty over the psychical functions in general. It would seem probable that by more exact methods and skilful operations general localized areas will be established throughout the brain, but that these areas can be absolutely defined is quite improbable; first, because they seem gradually to overreach, one area into the other, and, second, the brain is a vicarious organ and the extent of this characteristic will be difficult to determine. But when one thinks of the complexity of the finer anatomy of the brain, not to mention its histo-physiology and chemism, the vastness of the field of investigation is evident; yet these positive results in the coarser anatomy and physiology are an initial starting-point of the highest importance, and may lead in the future to things as yet unthought of.

A recent experiment illustrating kinæsthesia was described by Dr. Ransom; it was a case of epilepsy where the convulsions began by tingling and spasm in the left hand; the following permanent abnormal conditions resulted in this hand: (1) Slight tactile anæsthesia, (2) diminution of muscular sense, (3) diminution of motor power. The operation showed a cyst compressing the cortical centre for the left hand. After recovery from the operation this area was faradized by electrodes inserted through the scalp, without an anaesthetic. From this resulted (1) contraction of groups of muscles in arm and hand by moderate current, (2) production of sensation with a weaker current, contraction added when current was strengthened, (3) improvement of muscular sense during and after stimulation, (4) weakening of voluntary motor power, after a strongly induced contraction.

Dr. H. Donaldson, in his observations on the anatomy of the brain of Laura Bridgman, found the following peculiarities: depression of the motor speech-centre, a slenderness of the first temporal gyrus on both sides and a blunting of both occipital poles with a special disturbance of the fissures in the right cuneus, poor development of temporal lobes, the cranial nerves connected with the defective sense organs were slender, the left optic nerve being the one most affected; the extent of cortex was normal but unduly thin all over; this thinness, however, was most marked in the areas for the defective senses, due in part at least to the smallness of the cortical cells there present. In general, the case represents a maximum peripheral disturbance in the sensory cranial nerves, associated with only such central lesions as followed from lack of exercise and growth.

In his investigations of the muscular sense in the blind, Dr. Goldscheider found a developed sense of touch in the hand and finger joints, and the cause of this was psychical, consisting in a sharpening of the attention and in practice. The sense of location in the skin is small in the blind. In order to recognize forms by touch, the sensation of motion is of greater importance than the sensibility of the skin. Children, whether blind or not, possess a finer sensibility for passive motion than adults.

An interesting paper was that on "A Law of Perception," by Professor Lange of Odessa. The process of every perception consists in a rapid change of a whole series of psychical moments or steps, in which every preceding step presents a less concrete and more general condition, and every following step a more concrete and differentiated psychical condition. There are four principal steps, or stages, in this process of perception: (1) the simple shock, without quality, (2) the consciousness of general modality in the sensibility, (3) consciousness of its specific quality, and (4) consciousness of its spacial form.

The steps, or stages, of our perception correspond to the development of perception in general biological evolution. The so-called muscular reaction consists in a reaction in consciousness upon a simple and undifferentiated shock; the muscular or the in-

nervation effort is not essential to the muscular reaction. The so-called sensorial reaction is not a determinate act, but the reaction upon one of the following steps of perception. The relation between subject and predicate in an act of judgment is a particular case of the law of perception. The consciousness of difference has no ground in the sense of time. The so-called time of choosing shows no element of will.

Mrs. C. L. Franklin, after explaining the difficulties of the Hering or the Young-Helmholtz theories of light sensations, proposed the following new theory: In its earliest stage of development vision consisted of nothing but a sensation of gray (using the word gray to cover the whole series, black—gray—white). This sensation of gray was brought about by the action upon the nerve-ends of a certain chemical substance, set free in the retina under the influence of light. In the development of the visual sense, the molecule to be decomposed became so differentiated as to lose only a part of its exciting substance at once; these chemical constituents of the exciter of the gray sensation can therefore be present separately and cause the sensation of red, green, and blue. A recombination of these substances produces the gray sensation; the mixing of these three colors gives a sensation of no color at all, but only gray. The theory is that of a differentiated color-molecule.

Professor Pierre Janet gave a somewhat extensive description of a disease which he designates as a new form of psychological disaggregation, a mental disease consisting in the weakening of the power of synthesis, which permits during each moment to attach new psychological phenomena to the personality, which are reproduced in the mind. This disease has different forms, according as the incapacity for synthesis affects the sensations, movements, or souvenirs.

Professor Liégeois of Nancy showed it to be quite probable that a woman, who had been condemned to twenty years of hard labor for attempting to poison her husband, was suggestible and hypnotizable to a high degree; that she had received suggestions from a doctor, her lover, to poison her husband in order to be able to marry the doctor; that her moral liberty was greatly diminished if not abolished. Professor Liégeois commended such cases to magistrates, judges, physicians, and juries, so that incompetence and contradictions and excessive severity may be prevented.

Dr. Liébeault and Professor Liégeois described a case of monomaniacal suicide, which was cured by suggestion during hypnotic sleep. It was a woman who had had tendencies to suicide for eleven months.

Dr. Bérillon, editor of the *Revue de l'Hypnotisme*, spoke on the applications of hypnotic suggestion to education. From an experience of attempting hypnotism with some 250 children of both sexes, he deduced these conclusions: In ten children from six to fifteen, of different classes of society, eight could be put into profound sleep after the first or second seance. Contrary to the general opinion, the difficulties of causing profound sleep were greater in proportion as the child presented neuropathic hereditary defects. Healthy children with good antecedents were generally very suggestible, and consequently hypnotizable; they are very sensitive to imitation. While their sleep has the appearance of normal sleep, yet it is easy to obtain amnesia on awaking, negative hallucinations, suggested dreams, and automatic accomplishment of suggested acts. This sensibility to suggestion and hypnotism has been utilized in treating cases which concern pedagogics as much as medicine; such are those with nervous insomnia, nocturnal terrors, somnambulism, kleptomania, onanism, incontinence of urine, inveterate laziness, filthiness, and moral perversity. These facts have been verified by a large number of authors; they belong to practical psychology. Suggestion constitutes a process of investigation which permits us to submit to a rigorous analysis the different intellectual faculties of children, and thus to aid pedagogics by the experimental method.

Mr. F. W. H. Myers, in a paper on "The Experimental Induction of Hallucinations," considers it a drawback to experimental as compared with introspective psychology that we are liable to lose in profundity what we gain in precision; new experiments are required if the operations of the subconscious strata of our in-

telligence are to be reached; such operations tend to be manifested spontaneously in forms of active and passive automatism, such as automatic writing and visual or auditory hallucinations. As to the extent to which these phenomena can be reproduced experimentally, hypnotism is at present the principal means. A form of hallucination which is harmless and easily controlled is "crystal vision," that is, the induction of hallucinatory images by looking steadily into a crystal or other clear depth or at a polished surface. In this way the crystal helps the externalization of those images, sometimes by scattered reflections which suggest *points de repère*; or by partially hypnotizing the gazer. But a crystal vision may sometimes pass insensibly into the summoning up of externalized images, or quasi-percepts, with no definite nidus or background. Such images, or percepts, may depend upon a perceptivity antecedent to sensory specialization and of wider scope.

In speaking of experiments in thought-transference, Mrs. Sidgwick considered the hypnotic state as favorable in such inquiries. By thought-transference is meant the communication of ideas from one person whom we call the agent to another called the percipient, independent of the recognized channels of sense. Mrs. Sidgwick conducted her experiments in conjunction with Professor Sidgwick and others. The successful percipients were seven in number, and were generally hypnotized. It was possible to transfer numbers, mental pictures—that is, mental pictures in the agent's mind—and induced hallucinations given by verbal suggestion to one hypnotic subject and transferred by him to another. There were failures, but the proportion of successes was sufficient to show that the result was not due to chance. One percipient succeeded in experiments with numbers, when separated from the agent by a closed door and at a distance of about seventeen feet. Sometimes the ideas reached the percipient as visual impressions received with closed eyes, sometimes as hallucinations on a card or paper, or by automatic writing, or by table tilting.

It is not known how to produce results at will; only certain persons seem capable of acting as agents or percipients, and these persons succeed at one time and fail another, varying at different times in the same day; the reason for this is as yet unknown.

In the nerve-centres of flying in certain insects, Alfred Binet showed that the dorsal root is motor and the ventral root is sensitive.

Professor Preyer of Berlin read a paper on the origin of number. All concepts can arise through the senses only. No concept (even the concept of number) through heredity alone, without individual sense-impressions, can take place. But the child, like many animals, can value things and numbers without knowledge of numbers; it feels the numbers, not by means of touch or sight, but through hearing. The series of positive whole numbers did not arise originally through addition of 1 to 1; such a hypothesis presupposes a knowledge of a number, namely of 2, and a method of adding. Numbers are acquired in a normal way through hearing and comparison of tones, but later through touch and sight.

As to the effect of natural selection on the development of music, Dr. Wallaschek said that primitive music is not an abstract art, but, taken in connection with dance and pantomime, is bound up with the necessities of primitive tribal life, that is, in war and hunting, for which these dances seem to prepare, and, further, that it helps the tribe to maintain its strength and skill during times of peace. These dances are of a social nature, being performed by the whole tribe with great exactness, due to the influence of rhythm, of which primitive music chiefly consists. This tie of music enables the community to act as one body, holding the community together. Tribes accustomed to *play* at war and hunting associate more easily, act better in case of need, and so are better prepared for life. The musical faculty is thus developed and trained for this purpose.

Dr. Witmer presented a contribution to experimental æsthetic, taking up "the æsthetical value of the mathematical proportions of simple figures." No measurements of the proportions of the human form, as found in nature or in art, nor in beautiful specimens of architecture will demonstrate the æsthetic value of the

mathematical relations of their parts; for we never can be sure that their æsthetic value does not rest upon an associative or other factor rather than upon the direct mathematical proportions; and the freedom in the choice of parts to be measured must throw considerable doubt upon the results of all measurements. Such attempts have proved no more than a limited æsthetic value of the proportion 1:1, while for the various other simple mathematical relations nothing decisive has been shown. A better method than Zeising's or Fechner's affords a choice not limited to a set of arbitrary proportions, but opens to a series of figures whose mathematical proportions vary in a constant ratio between the proportion of 1:1 and 1: $x$  ( $x$  being any desired large number). This method permits of an easy observation of the relative increase or decrease in the æsthetic feeling attaching to the regularly increasing proportions. For all groups of figures and for all positions of the figure there are but two pleasing proportions: the ratio 1:1, or perfect symmetry, and a ratio which lies between 2:3 and 1:2, the most pleasing proportion. The proportion 1:1 is æsthetically so far from all other proportions that a comparison between it and any other proportion on the same terms as between the other proportions among themselves is impossible. The most pleasing æsthetic proportion subsumes itself under æsthetic contrast; the æsthetic value does not lie in a pleasing and complex equality of the relations of the parts of a figure, but in a pleasing *difference* of parts. The proportion is therefore not clearly discoverable in complex designs and objects, as the demand for the best contrast of parts may easily give way to other considerations.

Dr. Alexander Bain's paper was entitled "The Respective Spheres and Mutual Helps of Introspection and Psycho-Physical Experiment in Psychology;" the recognized sources of our knowledge of mind are first and foremost *introspection* with the aids of outward signs; to which succeed the study of infancy, of abnormal and exceptional minds, and of the lower animals; also the workings of society collectively; next physiology; and last psycho-physical experiments. The metaphysical problem of knowing and being, and that of the tracing of the origins of our mental furniture, have hitherto been the leading ones where introspection has been mainly employed. Neither of these are utile in the ordinary sense. Introspection takes the lead in qualitative analysis of mental facts; the next consideration is quantitative analysis, or the mensuration of psychological quantities; here psychophysics can render important service. The following is a list of researches where both methods concur: (1) The economy of muscular mechanism; (2) the fundamental laws of the intellect, more especially as regards memory acquisitions; (3) the fluctuation of our ideas in consciousness; (4) the conditions of permanent association as against "cram;" (5) plurality of simultaneous impressions in all the senses; (6) the fixed idea; (7) similarity in diversity. In all these experiment can come in aid of introspection, but cannot supersede it without loss and failure.

Professor Theodore Ribot's paper concerning concepts had for its object an inquiry as to the immediate state of mind at the instant a concept is thought, to determine whether this state differs in individuals. One hundred persons of every class and degree of culture were interrogated by announcing to them abstract terms (not letting them know the purpose beforehand) and noting the immediate state of consciousness which these terms evoked. The results were: 1. With the majority a general term awakened a concrete idea or representation, ordinarily a visual image, rarely a muscular image. 2. Many saw the word as printed, purely and simply, without any concrete representation. 3. Others (fewer in number) had only the word in the mind as heard, perhaps with motor images of articulation but without concrete image; without vision of the printed word. 4. The highest concepts, such as cause, relation, infinite, etc., did not give rise to any representation whatever in the case of the majority. Even those persons belonging to the pure concrete type declared they had nothing in their mind. There are therefore certain concepts to which an *unconscious* state corresponds. Hoping to penetrate into the nature of this unconscious state, Dr. Wize continued the investigations on certain hysterical cases at Salpêtrière; they were interrogated first in the hypnotic state, then when awake, thus permitting a compari-

son of responses. The results were more numerous and explicit in the hypnotic state than in the normal.

In speaking of the future of psychology, Richet said that psychology is one of the elements of physiology, and the most obscure; the first question is to know the connection which unites mind and body; at present we know nothing about it. An idea, a reasoning, a passion, are phenomena which do not seem to have the power of being reduced to a material phenomenon. It is certain, however, that there is a connection: without brain, or rather without nerve-cell, there is no intelligence. The first problem of psychology is therefore a most complete physiology of the brain: relations of ideation with cerebral circulation, with chemical changes in nerve-cells, with electric phenomena; localization of psychical acts in this or that part of the brain; in other words, a physiological *résumé* of the brain. We must recognize that brain physiology is little developed compared with the physiology of the heart or muscles. Physiology, properly speaking, is a study of sensations: relations of sensation with peripheral excitation, differential perceptive sensibility—the threshold of excitation; these are investigations more difficult to pursue than the general physiology of the nerve-cell.

Comparative psychology treats of the relations of man with other beings, and with the insane and criminal, from the intellectual point of view. One cannot admit that the human soul is stationary; it evolves, and therefore can be perfected through a sort of natural selection. The data for this problem are wanting, yet the future of humanity depends upon it. In transcendental psychology we have numerous data (often or almost always imperfect), which permit us to suppose that human intelligence has extraordinary resources and forces of which we have no conception. The future psychology will give us the key to clairvoyance and presentiments. If it should be proved that these are all illusions, a service would be rendered; sooner or later we will be able to say whether transcendental psychology is a reality or an illusion.

#### LETTERS TO THE EDITOR.

*\*\*\* Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

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#### The Libyan Alphabet.

I SHALL make no reply to the letter of Professor Keane in *Science*, Nov. 4, as there can be no advantage in discussing scientific questions in either the tone or the method which he adopts.

As the general subject, however, is one of great interest, I have secured permission to bring it before the Oriental Club of Philadelphia at its December meeting, when I expect to prove the following positions:

1. That certain able French scholars maintain that the Libyan alphabet antedates the foundation of Carthage, and probably had other than a Semitic origin.
2. That the first form of every letter, simple and compound, of this alphabet, as given by Hanoteau in his "Grammaire Tamachek," contains no curved lines.
3. That the only similarity noted by Hanoteau in that work between the Tuareg and Semitic writing is that they are both read from right to left.
4. Abundant documents in "Tifinar" to prove that this is not the case will be laid before the club.
5. Proof will also be presented that Prof. Keane's assertion in his last letter that "the Tuaregs never made any extensive use of this script" is utterly erroneous.

An official report will be made to *Science* of this meeting. As the president of the club is Mr. Talcott Williams, not only an excellent Arabic scholar, but the only American who, so far as I know, has collected Berber manuscripts in North Africa and brought to this country the only originals we have, readers of *Science* may expect a fairer statement of the case than in a discussion where personal irritation may be suspected of obscuring scientific fact.

D. G. BRINTON.

Philadelphia, Nov. 4.